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THE PLANT DISEASE REPORTER

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THE PLANT DISEASE SURVEY

DIVISION OF MYCOLOGY AND DISEASE SURVEY

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IN THIS ISSUE

The occurrence of tobacco diseases in the field in 1935 is reported by tobacco pathologists from various States, page 295. A similar report on plant bed diseases was published in the July 15 issue, page 192. Other reports on tobacco diseases this year: pages 36, 99, 104, 135, 144, 226, 239, 249, and 280.

Symptoms of Fusarium wilt of potato in Minnesota in 1935 are described by J. G. Leach and Henry Darling, page 299.

The incidence of bacterial wilt of corn in West Virginia this year is reported by C. R. Orton, page 302.

The Bureau of Entomology and Plant Quarantine reports the discovery of the white pine blister rust on Ribes in Illinois and Indiana, page 302.

Verticillium wilt of maple seems not to have been recorded from California nor on broad-leaf maple prior to the case reported by J. L. Mielke, page 303.

Progress of Dutch elm disease eradication is reported on page 303.

The smut on Calendula reported from Oregon by F. P. McWhorter, page 303, seems to be new to this country.

Extraordinarily cold weather has caused severe damage to crops in the Pacific Northwest and in California, page 304.

October weather is summarized on page 305.

Weather relations are discussed in the tobacco disease summary, and in the report of Fusarium wilt of potato.

TOBACCO DISEASES IN THE FIELD, 1935

by

P. J. Anderson, G. M. Armstrong, W. S. Beach, E. E. Clayton, J. G. Gaines, L. O. Gratz, R. G. Henderson, James Johnson, P. R. Miller, R. F. Poole.

Root-knot (Heterodera marioni)

The damage this year was much less than usual. Heavy root infection in Georgia and South Carolina did not develop until a large part of the crop was harvested. In eastern North Carolina, also, root-knot was much less prevalent. The disease was observed in a few fields in Virginia. In Florida damage was reported to be about as usual. It has been observed frequently that the actual knots are smaller in Florida than in certain other tobacco areas, but typically stunted plants are common.

Black Root-rot (Thielavia basicola)

Black root-rot was about usual in amount in most areas. In the Burley belt of eastern Tennessee there has been a rapid extension of severe infection and damage was much increased this year. In Virginia the injury on infested soil was much more pronounced than usual, due probably to the exceptionally cool weather during May and June. In North Carolina the maintenance of normal soil reactions by avoiding liming and the selection of a very desirable resistant variety by J. F. Bullock and E. G. Moss have solved the black root-rot problem. The disease was comparatively unimportant in Pennsylvania. Definite stunting symptoms were observed only occasionally. The parasite is rather commonly present there, however, since close examination of the roots in most fields shows at least a few slight lesions. There was a little more than usual in Connecticut due to the wet spring. The Broadleaf type of tobacco grown in Connecticut is naturally very resistant but this year fields of it were found severely affected with black root-rot, a condition not often seen in the past ten years.

Bacterial wilt (Bacterium solanacearum)

This disease continued to be very destructive in central North Carolina and caused more damage than usual in the eastern part of the State. It was less severe in Granville County than in 1934 when losses were very heavy. It occurs every season on the Granville and Durham types of soil and in seasons of unusual prevalence it also develops more severely on sandy soils bordering on those of heavier clay content.

Bacterial wilt was observed in a number of fields in Virginia, usually in localized areas.

Black-shank (Phytophthora parasitica nicotianae)

Black-shank appeared in 1935 for the first time in western Tennessee (Miller, P. D. R. 19: 280, Oct. 15), and in Kentucky (Valleau and Johnson, P. D. R. 19: 251, Oct. 1).

The infected area in western North Carolina is increasing in size each year, with evidence that water washing and transfer of infested soil on feet or implements are the major agencies in its spread. In 1935 the disease was found in Person, Caswell, Rockingham, Stokes, Surry, Forsyth, Guilford, Davidson, and Alamance Counties. Excellent progress toward the development of resistant varieties has been obtained in the breeding experiments of J. F. Bullock at Walkertown, North Carolina.

In Florida black-shank appeared somewhat earlier than usual soon after the plants were set out in April, but actual damage this season was no greater than in previous years. There were no outstanding losses except in one or two instances where a susceptible variety was planted.

Wildfire (Bacterium tabacum)

Developments of the past year suggest that wildfire, after years of limited occurrence, may again be spreading.

Damage was slight in Maryland and Pennsylvania, but very serious in western Tennessee and in Kentucky (Valleau and Johnson, P.D.R. 19: 249, Oct. 1).

Wildfire was observed in Virginia for the first time in recent years and caused serious damage on a few farms.

In Lancaster County, Pennsylvania, wildfire caused only 2 or 3 per cent damage in 1935. Infections were more or less common on the lower leaves in somewhat over 50 per cent of the fields, while local areas of disease were present in an additional 15 per cent. In the former cases, seed-bed origin was usually evident, while the local infections appeared to be instances of overwintering under field conditions or of secondary spread. Although rainfall was sufficient to grow a crop of good quality, there were no storms to spread the disease during the latter part of the season. The weather conditions made the results of seed-bed control appear more definite than usual. Wildfire has disappeared in the Clinty County area of Pennsylvania during the last two years.

For the last ten years this disease has been disappearing more and more in New England until in 1934 only one farm in the Connecticut

Valley was known to have wildfire. It was hoped that it would be completely stamped out in 1935 but, on the contrary, it became worse this year and was found very seriously affecting a dozen or more fields in different sections, so that there is a chance that it may be building up again.

In Wisconsin wildfire was practically nonexistent.

Blackfire (Bacterium angulatum)

This disease caused little damage in most areas. It was prevalent throughout North Carolina but caused only slight losses. In Virginia a few fields of late tobacco were seriously affected. In the Burley section of Southwest Virginia blackfire caused less injury than usual but it was more severe in the dark tobacco than it was in 1934. Cultural investigations in recent years indicate that Bacterium angulatum does not occur, or is at least extremely rare, in Pennsylvania. A little of this disease occurs every year in Connecticut, both in the Broadleaf and in the Havana Seed types. It is not a serious trouble in Connecticut and does not seem to be increasing in prevalence at all.

Downy Mildew (Peronospora tabacina)

Downy mildew was general in northern Florida, Georgia, South Carolina, North Carolina, and Maryland, and occurred in scattered localities in eastern Tennessee. Transplanting was delayed in a few areas but the damage caused was not serious.

Stem Rot (Sclerotium rolfsii)

This disease was present in many fields in Georgia, South Carolina, eastern North Carolina, and Virginia, but was less in amount than usual and caused little damage. In North Carolina it caused less loss than during any of the previous five years.

Mosaic (virus)

Only a trace of mosaic was observed in Florida, which is about as usual. Heavy losses occurred throughout North Carolina, especially in eastern counties. The source of the disease was plant beds where growers used chewing tobacco. In Virginia, mosaic infection was very prevalent in certain areas, some fields showing as high as 75 to 80 per cent of the plants affected, while in other adjoining areas the disease was noticeably scarce. In Wisconsin, as usual, mosaic occurred in fields or parts of fields with up to 100 per cent of the plants infected, and the disease was quite as bad as in past years.

Notes

Fusarium Wilt (Fusarium oxysporum nicotianae) occurred in an unusually destructive form on a few farms near Chadbourne, North Carolina. In one field fully 90 per cent of the stand was affected. The organism has long been known to be present in the South, but it has been assumed that the natural resistance of the Orinoco varieties was sufficient to prevent serious damage. Work is in progress to determine whether an extremely virulent strain of the organism may be involved. (E. E. Clayton).

Sore Shin (Corticium vagum) caused greater losses in North Carolina than in any of the preceding five years. In some fields losses up to 20 per cent were observed. In many fields this year plants died in large areas. Usually, many plants are attacked by this fungus but only an occasional one is killed and most of them survive and even produce good crops. The losses this season were alarming to some growers. (R. F. Poole).

Pythium Stalk Rot of Transplants. This is a wet, soft rot of the stalks, often running up however into the leaves, that kills the plants within two weeks after transplanting. The stalks become black and mushy and the plant falls over. It caused considerable trouble and concern among the growers in Connecticut this season. The damage was probably aggravated by a rainy setting season. Probably the disease is not new but its unusual prevalence this year brought it to our attention. Numerous isolations gave pure cultures of Pythium debaryanum. I believe this is the same disease as that known in Sumatra since about 1917 as "Stengelverbranding." Investigators there, however, found that there were three other species of Pythium associated with it. (Meurs, A. Parasitic stem burn of Deli tobacco. Phytopath. Zeitschr. 7: 169-185. 1934.) (P. J. Anderson).

Soft Rot (Bacillus carotovorus) occurred spasmodically on maturing tobacco throughout the eastern part of North Carolina during the wet periods of July. Infection was irregular and the losses observed were rarely greater than 1 per cent. (R. F. Poole).

Brown Leaf Spot (Macrosporium longipes) caused losses throughout North Carolina and was more severe than usual in the eastern counties, where up to 10 per cent damage occurred in some fields. In the piedmont area an early strain of tobacco selected by E. G. Moss and J. F. Bullock has shown less damage from the leaf spot, which appears late in the growing season, than the varieties such as Jamaica and Cash usually grown in that area. (R. F. Poole).

Dead-blossom Leaf Spot. This is particularly a disease of shade tobacco because great numbers of blossoms are allowed to mature on this type and to fall down on to the leaves below, where they

adhere and rot in situ in wet weather. Irregular but quite definite brown dead spots an inch or more in diameter develop around these decaying blossoms and ruin the leaves for wrapper purposes. Such spots also started pole rot in the curing sheds. This disease was very prevalent in Connecticut this year. Although various fungi could be found on the blossoms, I isolated usually only one fungus, Alternaria tenuis, from the tissues at the margins of the leaf spots and am therefore inclined to consider it as the usual agent in producing these spots. Investigators of similar spots in Europe found Botrytis cinerea as the primary agent. (P. J. Anderson).

Pole Rot, in Connecticut, caused about the average amount of trouble in the sheds this fall. There are several types of pole rot and they may not all be caused by the same organism. I investigated rather exhaustively one common type in which there are numerous small dark spots scattered like freckles over the leaves. These spots are invariably filled with mycelium of Alternaria tenuis. (P. J. Anderson).

Ring Spot (virus) was uncommonly extensive on experimental plots near Lancaster, Pennsylvania. The chief perennial weed in the vicinity was the Canadian thistle, and it showed what appeared to be symptoms of this disease. (W. S. Beach).

Brown Root-rot (Non-par.) occurred in a small percentage of the fields in Wisconsin. (James Johnson).

SYMPTOMS OF FUSARIUM WILT OF POTATO IN MINNESOTA THIS YEAR

J. G. Leach and Henry Darling

A rather unusual development of a potato disease occurred in Minnesota during the past season. During the second week in July we observed a few plants in various potato fields in the west central part of the State that showed very unusual symptoms. The plants had made very good growth, but suddenly the leaves began to roll upward and take on a decided reddish pigmentation. Axillary shoots began to develop abnormally, and aerial tubers were found very abundant in the axils of the leaves, especially on the lower part of the plants. During the second and third weeks in July these plants increased in number rapidly until in many fields as high as 50 per cent of the plants were infected, although most of the fields showed a somewhat lower percentage of infected plants. At first observation it seemed as if a new virus disease had made its appearance, and at first we were unable to diagnose it with certainty. Further observations, including microscopic examinations and cultural studies, convinced us that the disease was nothing more than Fusarium wilt with atypical symptoms. The vascular bundles of the lower part of the stem were always brown, microscopic examination showed the presence of fungus

mycelium in the vascular elements, and repeated isolations yielded a species of Fusarium. Microscopic examination also revealed the fact that there was an excessive accumulation of starch in all of the above-ground parts. The general appearance of the disease was somewhat similar to that given by Goss for wilt caused by Fusarium eumartii, in wet weather but the Fusaria isolated answer the description of Fusarium oxysporum more closely than they do F. eumartii.

Fusarium wilt of potatoes, along with other Fusarium wilts, has been on the increase in Minnesota during the past four years. The summers of 1931 to 1934 inclusive were excessively hot and dry, which resulted in a high soil temperature. In 1934 we estimated 4 per cent of Fusarium wilt in the State, which was higher than any report during the past fifteen years. On account of the extreme drought conditions last year it was often difficult to distinguish wilted plants from those that had died prematurely on account of drought, but microscopic examination of the stems and tubers showed that much of it was due to Fusarium wilt. The wilt that occurred in 1934 was totally unlike that of the past season. In 1934 the plants wilted rather suddenly, became flaccid, the leaves turned brown and dried up, and the plants died as if they were suffering from a total lack of moisture.

We have attempted to explain the abnormal appearance of the disease in 1935 on the basis of weather conditions. The weather during July and August of 1935 was excessively warm and excessively humid. We are quoting below from the Climatological Data of the United States Department of Agriculture Weather Bureau, volume XLI, numbers 6, 7, and 8, 1935, the general summary of the weather conditions in June, July, and August for the State, and the records from Bemidji and Grand Rapids, two stations in the regions where the condition was most prevalent.

> June: The month was considerably cooler and somewhat wetter that usual, and in most districts much less than the normal amount of sunshine. June has been cooler four times in the last 45 years. It was the wettest June since 1925. The precipitation was frequent in occurrence and was well distributed, both geographically and through the month.
>
> July: It was, with but one exception in 1916, the warmest July since the beginning of Statewide records in 1891. Daily mean temperatures were above normal almost continuously. Generous rains early in the month with high temperatures favored rapid growth of vegetation, although some grain was lodged, hay damaged, and some washing of crops occurred. However, the warm moist weather was conducive to rust development on small grains, especially spring wheat which had been sown late and was more susceptible in its critical stage.

August: The month was somewhat warmer and considerably wetter than usual. Daily mean temperatures were above the normal almost continuously from the 1st to the 25th. Thereafter, to the close of the month, unseasonably cool weather prevailed. Precipitation was fairly well distributed through the month. It was the wettest August since 1928. General, heavy to excessive, timely rains during the latter half of the second decade terminated an extended period of high temperatures and also relieved the dry conditions that existed in many localities.

Station	Temperature in °F							Precipitation in inches			Number of days			
	Mean	Departure	Highest	Date	Lowest	Date	Greatest daily range	Total	Departure from normal	Greatest in 24 hours	With .01 in. or more precip.	Clear	Pt. cloudy	Cloudy
					June									
Bemidji	55.2	-8.7	83	29	28	7	38	4.79	+0.69	1.00	16	5	16	9
Grand Rapids	58.0	-4.0	81	29	33	8	38	2.32	-1.58	0.57	11	5	21	4
					July									
Bemidji	73.1	+4.6	95	3	54	15	32	5.27	+1.63	1.55	10	7	21	3
Grand Rapids	71.6	+4.2	94	3	51	15	32	5.59	+2.58	1.51	14	9	18	4
					August									
Bemidji	66.0	-0.7	93	15	32	31	32	3.72	+0.46	1.00	9	12	15	4
Grand Rapids	64.9	+0.7	88	11	32	31	32	3.44	+0.37	0.95	13	13	14	4

You will note that the month of July was excessively hot (5.2° above mean for past 45 years) but that the hot weather was accompanied by heavy rainfalls and high humidity. This condition continued throughout the first half of August and then was followed by relatively cool weather accompanied by high humidity. The rainfall records for July, 1935, at Bemidji and Grand Rapids near where the wilt was most prevalent are 5.27 inches and 5.59 inches, respectively. The rainfall, furthermore, was distributed well over the month, it having rained sixteen and fifteen days, respectively, during the month of July. These facts and other data which we can not include here all point to the conclusion that soil temperatures were sufficiently high for abundant infection of Fusarium wilt but that, on account of the high

humidity, the lethal effect of the fungus was reduced. The water requirement was greatly decreased by the heavy rainfall and high humidity which prevented the wilting and rapid death of the plant which occurs in normal season. The continued growth of the plant with the accompanying photosynthetic action resulted in the normal amount of starch production, but the fungus in the lower part of the vascular system inhibited its translocation to the tubers. The excessive accumulation of starch in the parts of the plant above ground is sufficient to account for the abnormal symptoms, e.g., the production of the red pigment, the development of axillary shoots and aerial tubers. (University of Minnesota Department of Agriculture, Division of Plant Pathology and Botany, Oct. 30).

BACTERIAL WILT OF CORN IN WEST VIRGINIA IN 1935

C. R. Orton

Bacterial wilt (Aplanobacter stewarti) has been very serious in West Virginia for three or four years. The incidence of this disease was less noticeable this year than in the previous two years. C. R. Burnham reports that it was severe in his breeding plots at Morgantown. I think the condition in these plots was more pronounced than in any of the commercial fields or gardens. (West Virginia College of Agriculture, Division of Biology, Oct. 18).

WHITE PINE BLISTER RUST FOUND IN ILLINOIS AND INDIANA

The following report was furnished by the Bureau of Entomology and Plant Quarantine.

Blister rust (Cronartium ribicola) was found this season in Illinois and Indiana, thus bringing the number of infested States to twenty-three. No trace of the disease had ever been discovered in Illinois before, and the only case in Indiana was one of an introduced infected pine which was found and destroyed eighteen years ago and from which blister rust never spread. On a survey undertaken this fall by the Division of Domestic Plant Quarantine and the Division of Plant Disease Control, two infected Ribes nigrum bushes were found on September 14 at Warren in Jo Daviess County, Illinois, and on September 27 the rust was located in LaPorte County, Indiana, on R. cynosbati. Specimens of these infected leaves were forwarded for examination to the Division of Forest Pathology, Bureau of Plant Industry, who reported on October 7 that spore measurements and a staining test identified the rust as white pine blister rust, Cronartium ribicola.

VERTICILIUM WILT OF MAPLE IN CALIFORNIA

J. L. Mielke

During June, 1935, near Calistoga, Napa County, sickly and dead trees of broad-leaf maple (Acer macrophyllum Pursh) were found to be affected with a Verticillium considered to be of the dahliae group. Severe damage had been caused to a planting of fine large trees between thirty and forty years of age bordering both sides of a private roadway about two hundred yards in length. Broad-leaf maple is native to this region. Symptoms of the wilt were commonly noted in the natural stand of this species occurring along the main highway over a distance of about ten miles from near Calistoga to the vicinity of St. Helena. The distribution of the fungus on this host has not been determined. Apparently this is the first record of a Verticillium on maple in California and the first report of this fungus on A. macrophyllum. (Division of Forest Pathology).

DUTCH ELM DISEASE ERADICATION

(From Bureau of Entomology and Plant Quarantine reports for weeks ending October 26, November 2, and November 9.)

During the period Dutch elm disease was confirmed in 94 trees, of which 78 were in New Jersey, 15 in New York, and one was the third tree found to be affected at Brunswick, Maryland. The number of diseased trees eradicated during the three weeks was 110.

Up to November 9 a total of 14,008 trees have been found to be infected, and of these 13,978 have been removed.

SMUT FOUND ON CALENDULA IN OREGON

F. P. McWhorter

I am sending a specimen of smut on Calendula, caused by Entyloma calendulae (Oud.) D By. The smut was found first in February in a Portland greenhouse where it was doing much damage. Later, in September, it was found in an outdoor planting near Astoria.

There does not seem to be any previous record of the occurrence of this fungus on Calendula in this country. (Division of Fruit and Vegetable Crops and Diseases, Nov.)

COLD WEATHER IN WEST CAUSES SEVERE DAMAGE TO CROPS

Record-breaking low temperatures during the first week of November caused great damage to unharvested apples, potatoes, and truck crops in Washington, Oregon, and Idaho. In Washington, where losses were heaviest, several thousand carloads of apples still on the trees or in boxes in orchards were frozen hard and unsalable. Fruit and nut trees were probably damaged.

In California there was considerable frost damage to cotton, tomatoes, grapes, and truck crops, and some orchard heating was necessary. (Information from U. S. Weather Bureau Weekly Weather and Crop Bulletin, weeks ending Nov. 5 and Nov. 12)

OCTOBER WEATHER

(From U. S. Weather Bureau Weekly Weather and Crop Bulletin, week ending Nov. 5).

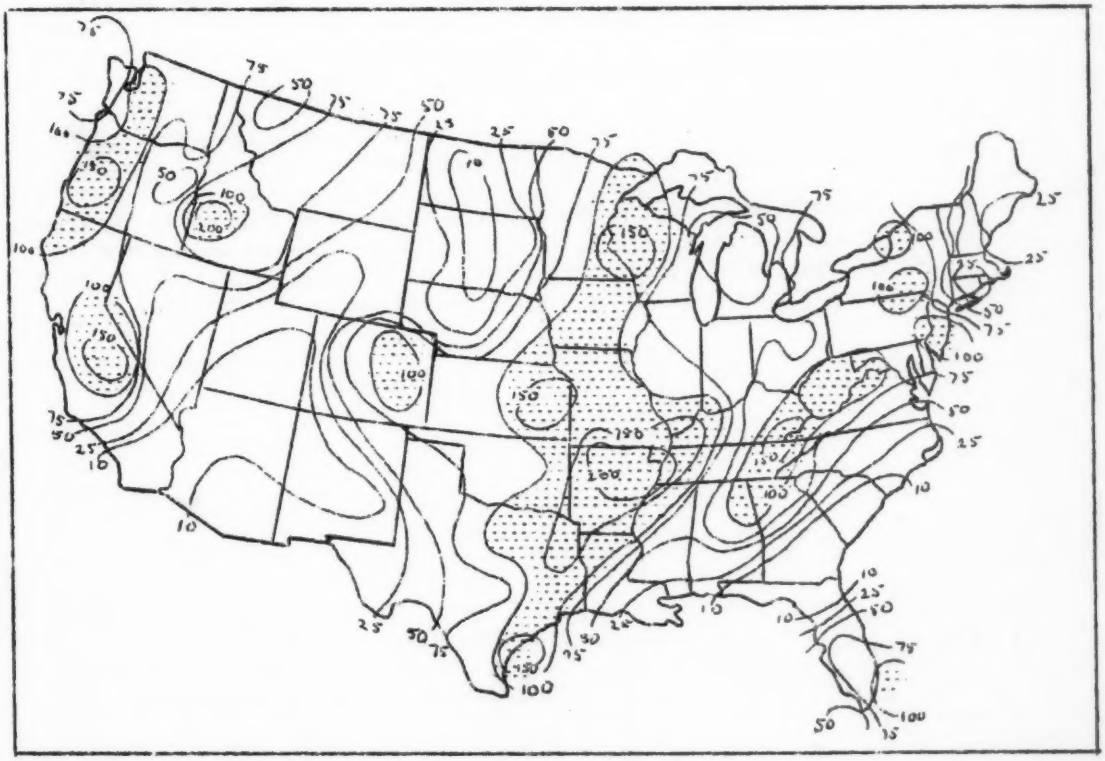

Figure 57. Percentage of normal precipitation for October, 1935. Shaded, normal or above; unshaded, below normal.

October 1935, was prevailingly mild and fair, with rainfall below normal in most portions of the United States, except that the first week of the month was abnormally cold in central and northern sections and the last few days brought a marked cold wave to the Northwestern States. Early in the month untimely frosts, extending as far south as the northern portions of the east Gulf States, did considerable damage to late crops, but thereafter the weather was mostly mild. On October 29 the first real cold wave of the season appeared in the Northwest, bringing temperatures below zero in some sections, and cold weather continued there, with minimum readings of around zero or below, for an entire week. An extreme of 20° below zero was reported at Havre, Mont., on the morning of November 2. This cold wave did not move eastward to any considerable extent, and mild weather continued over most of the eastern half of the country.

Figure 57 shows that the month had more than normal rainfall over a considerable north-south belt in the central portion of the country, and also locally in the Appalachian Mountains of the East, and in North Pacific sections. Otherwise there was less than the normal amount of moisture, with large deficiencies in the Southeast, the Lake region, and most of the western Great Plains and Rocky Mountain States. In parts of the Southeast and in a good many western sections less than one-fourth the normal amount of rainfall for the month occurred. A few stations including Pensacola, Fla., Yuma, Ariz., and Bismarck, N. Dak., had no measurable amount of precipitation during the entire month.